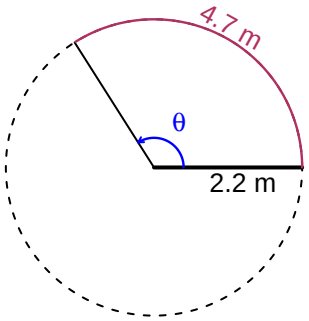
Name: Date:

Trig Final (SLTN v681)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 4.7 meters. The radius is 2.2 meters. What is the angle measure in radians?

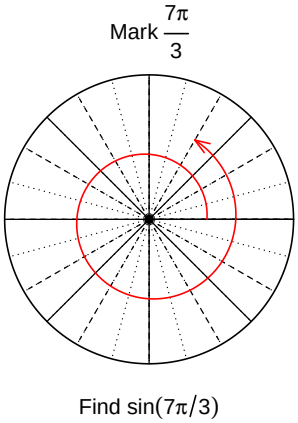


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

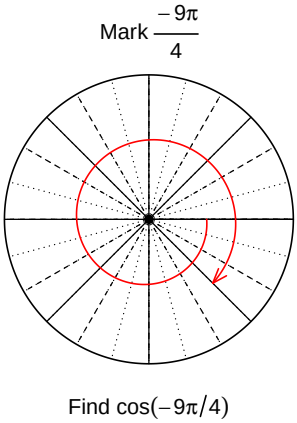
$\theta = 2.136$ radians.

Question 2

Consider angles $\frac{7\pi}{3}$ and $\frac{-9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{7\pi}{3}\right)$ and $\cos\left(\frac{-9\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\sin(7\pi/3)$



Find $\cos(-9\pi/4)$

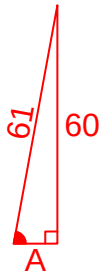
$\sin(7\pi/3) = \frac{\sqrt{3}}{2}$

$\cos(-9\pi/4) = \frac{\sqrt{2}}{2}$

Question 3

If $\sin(\theta) = \frac{-60}{61}$, and θ is in quadrant III, determine an exact value for $\cos(\theta)$.

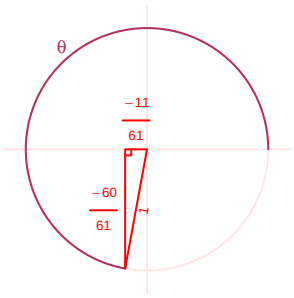
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$A^2 + 60^2 = 61^2$$
$$A = \sqrt{61^2 - 60^2}$$
$$A = 11$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\cos(\theta) = \frac{-11}{61}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = 8.73$ meters, a frequency of 4.3 Hz, and an amplitude of 7.44 meters. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -7.44\cos(2\pi 4.3t) + 8.73$$

or

$$y = -7.44\cos(8.6\pi t) + 8.73$$

or

$$y = -7.44\cos(27.02t) + 8.73$$